

of the College at Portsmouth—describes as “simply an examination of their mothers or governesses, or the preliminary schools they may have been at.” Their general education is then stopped; they are sent to the *Britannia*, and there, in the space of two years, they have to learn and pass an examination in a number of subjects, the list of which is utterly appalling. On this Prof. Soley, of the United States Naval College, says, “The course, as indicated by the examination papers, is far in advance of the mental powers of average boys of the prescribed age. The reason that more do not fail is to be found in the low standard of passing, and in the system of cramming carried out by clever tutors who are masters in the art of coaching pupils for examinations. No one seems to pretend that the students come anywhere near the ostensible standard, or carry away anything like real knowledge of the subjects embraced in the programme.” And what little is learnt is extremely evanescent: within six months the majority have forgotten all about it. It appears from a report by Dr. Hirst, the Director of Studies, that in a recent examination, and in papers specially prepared, the young gentlemen six months out of the *Britannia* obtained an average of 32 per cent. in Arithmetic, 28 in Algebra, and 17 in Trigonometry. Now the *Britannia* is essentially a mathematical school, and the Instructors are—it is fully proved by their immediate results—able, hard-working men; but they are crushed by a radically bad system, which necessitates the “teaching mathematics and navigation from the wrong end.” In this, the Instructors have no option; they are bound by an official schedule which requires the newly-caught children, knowing next to nothing of Algebra or Geometry, and very little of Arithmetic, to proceed at once to the solution of Plane and Spherical Triangles. Of course the little fellows learn to do these questions, because there is no passing for them unless they do do them; but “the knowledge is stuffed into them by a ‘damnable iteration’ sickening alike to the teacher and the taught.” What is the result? We have shown that they pass out of the *Britannia* and straightway forget it all. A Naval Instructor of many years’ experience assures us that his guiding rule has been to assume that a youngster joining his ship fresh from the *Britannia* knows nothing, and to begin him with the very elements of Algebra and Geometry. When this can be done, when the Naval Instructor is zealous and is supported by the Captain, when a suitable place can be found for study, and when the youngsters are industrious and clever, then, no doubt, very satisfactory results are sometimes obtained: but the difficulties in the way are exceedingly great. “Order it as you will,” Mr. Laughton says, “on board ship the routine will always interfere with the school, and interruptions are frequent. Nor does keeping the middle or morning watch quicken a boy’s faculties for study: with his eyes involuntarily closing, his head nodding over his book, the thermometer at 80° or 90°, and the perspiration dropping from the end of his nose—the difficulties in his way are very real. What a make-believe school, under such circumstances, often is, every Naval Instructor knows very well. The wonder is not that, with such a considerable expenditure of labour, so little is done, but that anything is done at all.” The present day affords an example of another difficulty. What amount of school,

we would ask, have the young gentlemen of the Mediterranean fleet done during the last three months? or, admitting that in some instances they have been present in the body, what amount of real study have they done? Our experience of boy-nature would lead us to answer—None. And after all these difficulties, the end is as might be expected: for a young officer in his final examination to show any real knowledge of his theoretical subjects is said to be quite exceptional.

The result then of the present system is that—speaking generally—the young officer, whilst a midshipman, learns neither the practical nor the theoretical parts of his profession: his time is muddled away; he gets a certain amount of crude knowledge crammed into him for his examination; and having passed that, if all desire of learning has not been crushed out of him, he has too often to begin again at the very beginning. In the majority of cases, Mr. Laughton tells us, an officer coming to the College for a voluntary course of study “does not know any mathematics at all”; and, he adds, “when men have got to the age of 25 or 30 without mastering the elementary principles of geometry and algebra, the task of then doing so is extremely irksome, and in many cases, utterly impossible.” Now it is admitted, and—as we have said—by officers of long and special experience, that this state of things does exist, and ought not to exist; and there seems a very general idea that the remedy must be a radical one, and be applied at the beginning; that the foundation of mathematical knowledge ought to be laid before a boy goes to sea at all; and that the early part of his time at sea should be spent in a specially appointed training ship, and not in a ship on active service, where the instruction of the young officers is a point of very secondary consideration, if indeed it has any real place. Mr. Laughton proposes that the cadets should not be entered till they have learned their mathematics, and suggests that this should be tested, in a competitive examination, at an age ranging from 16 to 17. Capt. Grenfell would prefer entering them by nomination at 12, and keeping them in a college under the Admiralty for 4 or 5 years. Each proposal has its own advantages; but we prefer a free competition, at a reasonable age, to the nomination of children; and we see no reason why these elementary subjects should be taught, at the expense of the public, to lads who are in no way bound to the public service. But either one, or the other, or any similar scheme would be an enormous improvement on the present system, which stands condemned by its acknowledged failure, and by the verdict of a very large number of experienced officers.

UNITED STATES FISHERIES

Report of T. B. Ferguson, a Commissioner of Fisheries of Maryland, January 1881. (Hagerstown, Maryland: Bell and Co.)

THE figures of fish culture as we find them in the various reports of the American fishery commissioners are perfectly startling in their magnitude. In this report of Major Ferguson we are favoured with an account of the piscicultural work carried on in connection with the “Shad” (*Alosa sapidissima*), an excellent food fish, which is now being bred in millions at several places

in the United States. A table of the numbers of these fish which have been brought to market, being the yield from the Potomac River only, shows that the catch in fifteen years, namely, from 1866 to 1880, amounted to 10,621,444 individual fishes. The averages captured in periods of five years were as follows:—

First five years (1866-70) ...	870,109	single shad.
Second „ (1871-75) ...	874,114	„
Third „ (1876-80) ...	380,065	„

These figures are instructive. The shad fishery, as demonstrated by the number of fish marketed at Alexandria and Washington, seems to have culminated in 1873, when the numbers offered for sale were 1,142,629 individual fish. After that year the supply begins to fall off, till in 1878 the figures are reduced to 166,923 single shad. The fluctuations of various years can be accounted for in different ways to some extent, but as the Commissioner says: “We must recognise in these statements the inevitable result of successive years of over fishing; of disturbing the fish on their spawning beds; and of preventing them from reaching such beds.” The ease with which all kinds of fish can be treated pisciculturally has been a really important discovery for the American people, because there has begun all over the United States a sensible, and in some instances a very marked, decline in the supply of nearly all kinds of fish, even the salmon—in that great depository of these fine fish, the Columbia River—are diminishing in numbers, consequent upon the incessant capture. It is gratifying therefore to learn from the present report that there need be no bounds put to the increase of our food fishes, and to be told that fishes inhabiting the salt water exclusively can be as readily propagated artificially, and increased to as unlimited an extent as the “anadromous fishes,” with whose spawning habits we are more thoroughly acquainted. We have at home been accustomed to look with feelings of wonder on the hatching of a hundred thousand salmon eggs as if that were a sort of miracle, but the record of the shad hatching operations given by Major T. B. Ferguson sinks into insignificance anything that has yet been accomplished in the way of “pisciculture” in Great Britain. In a period of some fifty days, upwards of twenty million eggs of the shad were obtained, and over eighteen millions of these eggs came to life as fish! These young fish were all safely deposited in waters where they had a good chance of growing to maturity and ultimately contributing to the national commissariat. It would seem to be a leading idea of those who have the largest say in the regulation of the American fisheries that it is better to multiply the fish by means of what is known as pisciculture than to restrict in any way the operations of the fishermen during the legitimate fishing seasons; so long as the work of the pisciculturists can keep pace with the work of the fishermen there can be no objection to the occasional glutting of the markets with such wholesome food.

We learn from a portion of Mr. Ferguson's report that there are on the Atlantic Coast of the United States nine fishes belonging to the herring tribe. Although no special hatching station has yet been established for the propagation of the Clupeidae, it has been ascertained that like other fish they can be operated upon “pisciculturally,”

and many hundred thousand eggs of these fish have been hatched by way of experiment, the newly developed fry being at once restored to the water. Some varieties of this fish are of great commercial importance, and will doubtless at once attract attention, as being capable of being bred in millions on the artificial system. Indeed the Menhaden has been already so operated upon with great success.

Some interesting details are given by Major Ferguson of the piscicultural work done in connection with the carp and landlocked salmon. Great interest has been taken in carp culture throughout the United States. The original stock of carp from which all supplies have been obtained, were imported by Prof. Baird, of the Smithsonian Institution, some years since from the best ponds of Europe—chiefly from Germany; the “leather” or scaleless variety is held in most esteem. It appears that the carp has been acclimatised in America with great success, increasing in bulk year by year with almost phenomenal rapidity, the ratio of growth being truly remarkable. This is accounted for by the great abundance of their natural food which these fishes find in American waters, and by that comparative mildness of the weather, which affords them a much longer feeding season than they have in their native country. During their spawning season, great pains are taken to procure the eggs of these fish; they are, however, allowed to spawn naturally, but the twigs and blades of grass on which the ova found a resting place were at once removed to ponds which had been prepared for their reception, where the eggs speedily came to life. The carp have been extensively distributed over the States of America in small numbers—from ten to twenty pairs only being given to applicants, but the fish has multiplied exceedingly, so that in the course of another year or two the carp will be quite a common fish throughout the United States. “This fish,” says the report, “is so admirably adapted for domestic purposes, that every one in the State who has even a small pond, such as is usually devoted to the collection of ice, should prepare it for rearing the carp, which, being largely a vegetable feeder, can be raised at very little expense, and can be utilised for the consumption of the waste of the kitchen garden.” It is interesting to know that a war of extermination had to be entered upon to get rid of the kingfishers: these feathered robbers having played havoc among the young fish. The “golden ide,” from its conspicuously brilliant colour, became the chief prey of the birds.

Among the miscellaneous fishery work mentioned in the present report is the hatching of 200,000 eggs of the Californian salmon in floating boxes in the north branch of the Potomac, near its source. The fry were protected till the umbilical sac was absorbed, when they were liberated to shift for themselves; it will be interesting to know how these fish progress. So far as it could be carried, the experiment was greatly lauded by experts in fish culture. The reporter is in favour of movable hatching boxes, being convinced that “by means of such apparatus our streams can be much better stocked with Salmonidæ, than by the systems hitherto pursued of developing the eggs in hatching houses and transferring the young fish thence.”

The remainder of the report is devoted to a long

treatise on the oyster, and an account of experiments on oyster culture, which we have not space to discuss in the present number.

OUR BOOK SHELF

Wanderings South and East. By Walter Coote. Maps and Illustrations. (London: Sampson Low and Co., 1882.)

Pioneering in the Far East, and Journeyings to California in 1849, and the White Sea in 1878. By Ludwig Verner Helms. Illustrations. (London: Allen and Co., 1882.)

ALTHOUGH these two volumes cover a very wide field, neither of them can be said to break on new ground. Mr. Coote does not profess to be much more than a tourist, but as he tells the story of his wanderings pleasantly, and touched at a few places concerning which our information is scanty, he may be held to have sufficient excuse for bringing the record of his journey before the public. He spent some time in the Australian Colonies and Fiji, and visited Norfolk Island. His wanderings further embraced the Hawaiian Islands, the New Hebrides, the Banks and Torres Islands, the Santa Cruz and Solomon Islands, New Galedonia and the Loyalty Group. China and Japan, and Central and South America were also embraced in his extensive tour. Mr. Coote is a good observer, and the information he gives concerning what he saw in the less frequented islands, the New Hebrides, the Santa Cruz, Solomon and Loyalty Islands, is a welcome addition to existing knowledge. He is chiefly interested in the people, habits, houses, implements, and weapons, and therefore the ethnologist may find something in his volume that will be of service. The illustrations are good, and the volume as a whole is extremely pleasant reading.

Mr. Helms is an old traveller, and most of his volume takes us back about thirty years ago. He spent considerable time in Bali and Borneo, where he took a prominent part in the events connected with Rajah Brooke; visited Cambodia and Siam, China and Japan, and spent some little time in California during the height of the gold fever. He brings together much curious and interesting information about Bali and Borneo, especially at the time of his sojourn, the condition of the people, their manners and customs, the state of trade, &c. He gives a very vivid description of an instance of suttee which he witnessed. His account of what he saw in California is interesting, and he finishes off with the record of a visit to the White Sea, in connection with some mining operations. Altogether his book is quite worth reading.

Hölzel's Geographische Charakter-Bilder für Schule und Haus. Herausgegeben unter Pädagogischer und Wissenschaftlicher Leitung, Von Dr. Josef Chavanne, K. v. Haardt, V. Prausek, Prof. V. Marilaun, Dr. Fried. Simony, Dr. Fr. Toulia, Dr. K. Zehden, &c. (Vienna: Edward Hölzel, 1882.)

WE have already referred, in connection with Hirt's *Geographische Bildertafeln*, to the comprehensive idea of geography entertained in Germany, and the admirable methods adapted for infusing into the teaching of the subject as much of reality as possible. For enabling the pupil to realise the features about which he reads in his text-books, we have never seen anything to equal the *Charakter-Bilder* which are being issued by Hölzel of Vienna, and edited by a large staff of some of the best teachers. These pictures are on a very large scale, are coloured by the oleographic process, and have all the appearance of good oil-paintings. Each picture is devoted to one subject, and measures something like $2\frac{1}{2}$ feet by 2 feet. The aim is evidently to illustrate the leading features of the earth's surface, and bring before the pupil the main characteristics of the different countries.

Nine of these pictures have already been published; their subjects are the Ortler Region, the Shoshone Cañons and Waterfalls of North America, the Gulf of Pozzuoli, the Sahara Desert, the Bernese Oberland (a double picture), the Rotomahana Region of New Zealand, the Sierra Nevada, the Eastern Border of the Anahuac Plateau. Thus, it will be seen, the subjects are very varied. To each picture there is a separate explanatory text, entering with somewhat minute detail into the characteristics of the region illustrated, its topographical features, geology, biology, &c.; the text being accompanied with wood engravings still further to help in the understanding of the subject. We need scarcely point out what an important help these pictures and their text must be in the study of geography, nor how admirably calculated they are to lead children to interest themselves in the subject. To the household library they would be an important addition, and even those who have long left school might turn them over with pleasure and profit. We should like to see them brought within the reach of English schools.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Researches on the Division of the Chlorophyll-Granules and upon the Occurrence of Hypochlorin in the Cyanophyceæ and Bacillariaceæ

I, IN the year 1881, made a considerable series of examinations of the division of the chlorophyll-granules of phanerogamous and cryptogamous plants, and upon the occurrence of Pringsheim's hypochlorin in the lower algæ, especially in the order Bacillariaceæ and Cyanophyceæ (Phycchromaceæ). The investigations are in detail described in my paper, "A chlorophyll és a növényi sejtmag morfológiájához. Irta Schaarschmidt Gyula. Rajzokkal egy fotogrammon. Kolozsvárt, K. Papp Miklós örökösénél, 1881. 56 pp. 16°" (Contributions to the Morphology of the Chlorophyll and Vegetable Nucleus. With photograms. Kolozsvár, 1881, &c.), which is published in the Hungarian language. I take the liberty of briefly communicating the chief results, by way of insuring my priority.

I. The division of the chlorophyll-granules was discovered by Carl Nägeli in the year 1844. After him Milde, Wigand, Hofmeister, Rosanoff, Sachs, Kny, Strasburger, Velten, Haberlandt, Mikosch found that the chlorophyll-granules multiply by division in the lower and the higher plants. According to these authors, the granules are divided by a constriction in the middle; the green colouring-matter retires to the poles; consequently the protoplasmatic isthmus between the daughter-granules is colourless. The new daughter-granules increase in size, until they become as large as their parent-granules. When detached, each divides again, and the process is repeated. But the process is, according to my observations not so simple. We find here an example of division that is very similar to the multiplication of the nucleus described and drawn by Hanstein, Strasburger, &c. The green colouring-matter retires before the division to the two poles of the oval-shaped granules, and in the middle a colourless band is thereby formed. In this state will be seen with powerful lenses (2000-3000 lin. magn.), and by careful preparation with alc. abs. and tincture of anilin, that in the protoplasmatic isthmus small threads (filaments) are formed. The extremity of the threads is immediately fixed in the protoplasmatic matter of the granules. If we examine the double granules, which are now lying detached at a little distance (united solidly by the threads), we see the threads between the daughter-granules expanded. This figure reminds us of the state of nucleus division called "cell-tun" (*Zell-Tonne*) by Strasburger. The new daughter-granules separate further and further; the threads are more and more extended, until the intervening space equals that occupied by two to three granules. During this time the inner portions, as they extend, develop more and more of the circle, until each becomes a perfect hemisphere. The